

**Utah State
UNIVERSITY
EXTENSION**

4620 Old Main Hill
Logan, Utah 84322-4620



PESTICIDES NO. 4
November 2003

Howard Deer and Richard Beard

PESTICIDE STORAGE FACILITY DESIGN AND MANAGEMENT PLAN

Safety is the number one reason for a well-managed pesticide storage facility, safety for both the workers and the environment. Protecting against spills not only protects the health of you and your employees and your family's water quality, but insurance carriers are limiting policies on environmental damage caused by a fire or spill involving agrichemicals and may require certain practices be put in place prior to writing the policy.

A properly designed and managed pesticide facility promotes storage, handling, and disposal practices that enhance worker safety and minimize the risk of point source contamination. An ideal facility incorporates safety features in all aspects of its design and provides reduced liability.

Proper storage of pesticides reduces hazards of poisoning or other accidents and helps maintain usefulness. Protecting the pesticide label so it remains legible is important. The label contains the information needed to properly and safely use the product and it has emergency information in case of an accident. Proper storage also helps reduce needs for pesticide disposal.

A separate building for storing pesticides is recommended because of the risk of fire. Suggestions are presented for storage building design, management, and disposal of pesticides. Additional information is available from your County Agent.

DESIGNING STORAGE FACILITIES

Electrical

All electrical service must comply with the National Electric Code (NEC) and any applicable state codes. Electrical design for a storage/handling building is covered under the NEC also referred to as NFPA 70. Use plastic, dust-proof, water-proof electrical boxes and switches. Plastic is not subject to deterioration like metal and can be exposed to limited amounts of water without posing a safety threat. It is important to install ground fault circuit interrupters (GFCI) protection when electricity is in close proximity to water and on all exterior applications.

Use vapor proof fluorescent or incandescent lighting fixtures. On small buildings, provide an exterior switch to control both the ventilation fan and the lights. An exterior operation light that indicates when the lights and fan are on is a convenient feature. Choose electrical equipment and wiring designed to prevent a spark from igniting a flammable vapor. Avoid sources of high temperature and sparks in storage areas. Duplex outlets, switches, fan blades, and motors are all potential sources of sparks. Use U.L. and National Electric Manufacturers Association (NEMA) listed anti-spark equipment if available.

Fire

To reduce the hazards associated with pesticide fires, consider storing pesticides in a separate, locked building. Mount an ABC fire extinguisher near the door. Never permit smoking, fires, or welding within the immediate area. Avoid excessive heat, flame, or ignition sources.

Treat a fire in a pesticide storage facility as though it was a flammable liquid or oil fire. Explosions of containerized pesticides are possible during fires. The smoke, fumes, vapors, dusts, and/or liquids produced by all burning pesticides are toxic. **DO NOT EXTINGUISH BURNING PESTICIDES WITHOUT PROPER PROTECTIVE CLOTHING AND A SUPPLIED AIR DEVICE OR SELF-CONTAINED BREATHING APPARATUS!**

Heating

An insulated, heated building may be needed if pesticides are subject to freezing. Provide heat by low pressure steam, hot water, or electric heaters that are U.L. listed for Class I hazardous locations. Never use or allow open flames or smoking in storage or handling areas. Installing a small heating system to maintain sufficient temperatures in the winter to maintain pesticide viability and extend shelf life. In some cases a small electric heater can provide zone heat more effectively than heating a large storage structure.

Mixing Areas

Consider mixing all pesticide formulations outside. If it is too windy to mix the chemicals safely, then it is too windy to apply the chemical. If it is too wet to mix the chemicals, then it is too wet to apply the chemical. Always wear a respirator when mixing chemicals as per manufactures instructions. If indoor mixing is used, a down-draft ventilation hood at the back of the mixing table can be used to remove dust and vapors. Down-draft hoods are superior to updraft hoods because the chemical is not taken up past the user's face.

Rinse Pad & Collection Tank

- Slope the rinse pad 2% to the center of the pad or far enough away from any side/end that the rinsate will not wash off the pad.
- Use berms or curbs whenever possible to contain the rinsate. The pad should have a sealed surface to provide chemical-resistant.
- No pipe or plumbing may pass through the concrete of the rinse pad.
- The water supply must have backflow prevention installed.
- Catch both rinsate and precipitation from the rinse pad. The collection system must be designed to contain at least 125 % of the volume of the largest chemical tank that will be placed on the structure.
- Use steel-grated floor drains to shallow concrete collection sumps. A sump is used to collect rinsate and wash water from the pad and allow reuse as makeup water for subsequent sprayer fillings. Prevent tracking of mud or chemicals off the pad by wheel traffic by properly washing down the equipment and pad.

To use the rinse pad, drive the sprayer onto the concrete pad and make sure that the sump drain valve is locked in the closed position. Any leftover field-strength chemical and rinse water from the sprayer drain valve is pumped into a marked rinsate tank. Any spills can be washed into the sump for later recovery. Wash water is collected from the exterior wash down of spray equipment and tank and plumbing cleanout.

The pad should be washed down, and then rinsate collected and transferred to storage or nurse tanks located on pad before a change in pesticide or after field operations on a daily basis. Sediment that collect in the sump should be removed prior to switching from one chemical to another. The sludge contains pesticides and must be disposed of properly.

After rinsing, the rinsate is collected and pumped to above-ground storage tanks. Store the rinsate from each pesticide or crop separately. Rinsate can be stored temporarily in various types of holding tanks, including mobile nurse tanks. A good choice, however, is one or more 300 gallon cross-linked polyethylene or fiberglass tanks. Liquid levels can be easily seen through these types of tanks. Consider mounting the rinse water storage tanks 3 to 5 inches above the concrete floor so leaks can be spotted easily and to prevent corrosion. Pumps and piping should be above ground too, and contained within the rinse pad area.

More than one rinse water tank may be needed. By separating rinse water by pesticide use into different tanks, it can be used later as makeup water the next time the product or a compatible chemical is

sprayed. Follow label instructions and mix only compatible agrichemicals. Rinsate used for makeup water should not exceed 20% of the volume of the spray tank.

For example, if 50 to 75 gallons of water is used to thoroughly clean a sprayer in which 6 to 10 gallons of spray may be left, the rinsate will be diluted to about 10% of the field strength. Diluting it again at four parts water to one part rinsate, means only 1% to 2.5% of the original field strength.

It is recommended that storage tanks be mounted on a level area at the back of the concrete pad, within low concrete walls high enough to contain an amount 10% greater than the volume of the tank should a severe leak occur. A separate sump in the containment area is needed to handle rainfall and potential rinse water spills. It is important to keep the sump pumped dry so rain water and snow will not become a handling problem. Sumps should be checked and rinsed regularly.

Site Selection & Sitework

Locate facility away from water sources which can become contaminated by an accidental spill. Choose a site which has not been used for chemical storage, mixing, loading, or equipment rinsing to avoid previous possible soil contamination. If not possible, take precautions to remove contaminated soil or otherwise decontaminate the site before constructing a rinse pad.

Consider removing all top soil, organic matter, and debris from site and excavate to a sufficient depth to allow the concrete slab and sub-base to be situated on firm undisturbed soil. Consider using crushed rock, compacted in 6 inch lifts.

Storage building construction should comply with local and state codes. Secure all necessary permits prior to construction.

Ventilation

Consider using constant low-rate mechanical or natural ventilation during non-occupancy and supplemental ventilation when the facility is in use. A two speed fan could be utilized to provide base-rate ventilation during non-occupancy and a high speed fan would be used for automatic, forced-air exhaust during occupancy. The high capacity of the fan(s) should provide approximately 7 air changes per hour. Because of fire hazards, the fan blades should be non-sparking.

Consider designing fresh air intakes and tempering that air by drawing the air through the attic, thereby reducing the heating requirements. Be cautious to avoid dead air spaces where ventilation is inadequate.

Exhaust fans mounted in the sidewalls should have ductwork to allow exhausting air at a level 15 inches above the floor. This will allow vapor or dust removal away from the occupants face.

Water Source

Consider using an elevated tank located next to the chemical storage building for filling sprayers by gravity flow. The water storage tank is filled by a water line from a site away from the pad. The bottom of the storage tank should be higher than the top level of the sprayer tank to prevent backflow. Insure that a hose bib from the sump can not be mistaken for drinking water.

Worker Safety

Provide an eyewash and deluge shower to rinse chemicals from the eyes, face, and body. Other necessary items include a first aid kit and spill response kit.

Examples of Design Features and Potential Compliance Problems

- Drain in storage area

- Storage of food or feed with pesticides
- Container cleaning area separate from mixing area
- Facility built on site previously used for mixing and loading
- Equipment rinse water or rinsate stored underground

PESTICIDE STORAGE MANAGEMENT PLAN

Pesticides come in many types and formulations. The most common types are herbicides, insecticides, fungicides, rodenticides, and fumigants but there are many more. Pesticides can be formulated as concentrates; liquids that are ready to use; solids such as dusts, wettable powders, or granules; or gases such as in pressurized cylinders. Packaging materials for pesticides include metal, glass, plastic, and paper.

General precautions

Always store pesticides:

1. In their original, labeled containers and never in beverage, food, open or other containers that could be mistaken for something else.
2. Out of reach of children, pets, and livestock. A well ventilated, dry, locked and labeled cabinet or storage room is recommended.
3. Separate from foods, feeds, drugs, or other edible products including their packaging materials.
4. Separate from protective clothing, respirators, gas masks, or goggles.
5. Away from sources of flame or ignition and away from sources of water. Consider the potential for flooding, fire, or other disaster.
6. With lids tightened. Periodically check for leaks or other problems.
7. Take precautions to keep the labeling intact and legible. The label is the legal document and if it becomes illegible, you may have compromised your legal use of the product.

Inventory

Recommended storage procedures include keeping an accurate and current inventory record that indicates product storage information such as special storage and handling needs and dates of arrival. Placing dates on product packaging or labels can be useful but don't obscure label information.

With the inventory, you should keep any applicable emergency response information in case of poisoning, fire, or spill. Keep a copy located in an area separate from the storage facility. Pay special attention to volatile agricultural chemicals both for their shelf life and for possible contamination of other products stored in the same area. Send a copy to your local fire control agency with a map showing locations of storage areas. Rotate your inventory to insure maximum shelf life.

Shelf Life

The shelf life of a pesticide is the storage time over which the product remains useful. To remain useful, the product must still be effective for its intended purpose and still be in a condition that allows it to be applied as directed. Shelf life is a function of several variables such as: time, sensitivity (temperature, moisture, light), formulation stability (dry, liquid, concentrated, ready to use), and container integrity (metal, glass, plastic, paper). Shelf life protection for pesticides includes: 1) storage in the original container tightly sealed, 2) storage in a cool, dry, and ventilated area, 3) keeping liquids above their recommended minimum

temperatures, and 4) keeping solids from becoming damp.

As a general rule of thumb, two years is considered the maximum storage life for most pesticides, although there are many exceptions to this. Shelf life of some specific pesticides follows:

<u>Common (Trade)</u>	<u>Shelf Life</u>	<u>Comments</u>
atrazine (Aatrex) 80W	At least 5 years	Under proper storage conditions.
atrazine (Aatrex) 4L	2 years	Under proper storage conditions.
bacillus thuringiensis (Di-Pel, Thuricide)	2 years	Store below 105°F.
barban (Carbyne)	At least 1 year	Under proper storage conditions.
benlate (Benomyl) WP	2 years	Decomposes if exposed to moisture.
captan (Orthocide) WP	3 years	Under proper storage conditions.
carbaryl (Sevin) WP	5 years	Remained effective up to 5 years.
DCPA (Dacthal) WP	At least 2 years	Under proper storage conditions.
diazinon	5-7 years	Keep liquids sealed and solids dry.
dicamba (Banvel)	At least 1 year	Under proper storage conditions.
dichlobenil (Casoron) 4G	At least 2 years	Keep dry, sealed, and cool.
dinocap (Karathane)	5 years	Under proper storage conditions.
disulfoton (DiSyston)	2 years	Under proper storage conditions.
fenbutatin-oxide (Vendex) WP	3 years	Under proper storage conditions.
fenbutatin-oxide (Vendex) 4L	2 years	Under proper storage conditions.
fenvalerate (Pydrin 2.4EC)	5 years	Under proper storage conditions.
glyphosate (Roundup)	At least 2 years	Store below 140°F.
malathion WP	2 years	Decomposes under high temperatures.
methoxychlor WP	Indefinite	Under proper storage conditions.
oryzalin (Surflan) WP	3 years	Mix well before using.
oxydemeton-methyl (Meta-Systox-R)	2 years	Under proper storage conditions.
paraquat (Gramoxone)	Indefinite	Do not allow to freeze.
phosmet (Imidan) WP	2-3 years	Under proper storage conditions.
pronamide (Kerb) WP	At least 2 years	Under proper storage conditions.
propargite (Omite)	At least 2 years	Under proper storage conditions.
simazine (Princep, Aquazine)	3-5 years	Stored up to 9 years.
thiram WP	4 years	Keep dry, sealed, and under 100°F.
trifluralin (Treflan)	3 years	Under proper storage conditions.

Cold Weather Precautions

Pesticide labels have a section on "Storage and Disposal." Products that are frozen should be warmed gradually to the indicated temperature and then rolled or shaken to re-dissolve crystals and achieve proper mixing. All products that have been in prolonged storage should be rolled or shaken to obtain uniform mixing. A simple test of liquid pesticides can help determine if they were frozen and may have reduced efficacy. Two tablespoons of the liquid concentrate should be added to a quart jar that is about three-fourths full of water, the mixture shaken thoroughly and allowed to sit for an hour. If the mixture remains uniformly milky, the pesticide is probably still good. If it separates to show a layered effect, it may have reduced efficacy. Contact the manufacturer.

References

1. "Chemical Containment Facilities," Doane's Agricultural Report, 53(36-5): 334.3-334.4.
2. "Fertilizer and Pesticide Containment Facilities Handbook", Midwest Plan Service, MWPS-37, 122 Davidson Hall, Iowa State University, Ames, Iowa 50011-3080. December 1990.
3. "National Symposium on Pesticide Containment: Design and Management", Midwest Plan Service, MWPS-C1 Conference Proceedings, 122 Davidson Hall, Iowa State University, Ames, Iowa 50011-3080. February 1992.
4. Noyes, Ronald T. "Modular farm sized concrete agricultural chemical handling pads", Cooperative Extension Service, 224 Agricultural Hall, Oklahoma State University, Stillwater, Oklahoma 74078.
5. Noyes, Ronald T. and David W. Kammel. 1989. "Modular concrete wash/containment pad for agricultural chemicals". ASAE Paper No. 89-1613. International Winter Meeting of The American Society of Agricultural Engineers, New Orleans, Louisiana.

Howard Deer
Extension Pesticide Specialist

Richard Beard
Extension Agricultural Engineering Specialist